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(54) **METHOD AND APPARATUS FOR MAKING PULP.**

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Description

The present invention relates to a method of making pulp from grinding goods, such as fibre material, in the grinding zone of a grinding apparatus by pressing it against a grinding surface provided with a pattern extending in the direction of movement of the grinding goods over the grinding surface for disintegration of the grinding goods, while the steam generated during the grinding work causes a pressure rise along the grinding surface.

When fibre material is ground in e.g. grinding apparatuses of disc type aqueous steam or other vapour is generated during the grinding operation as a result of the high power imposed on the grinding apparatus and thereby a high steam pressure will arise between the grinding segments of the grinding discs. This causes several inconveniences. The steam pressure produces high axial forces, especially at the outer part of the periphery of the grinding discs, which loads the grinding apparatus structure as bearings etc. and also causes bending of the grinding discs so that the grinding segments lose their parallelism. Another disadvantage is the influence of the steam upon the grinding goods, i.e. the fibre material. Thus in the grinding groove the steam pressure generally follows a curve which increases from the inner periphery of the grinding groove to a pressure centre somewhere on the outer half of the grinding discs in order later to sink again towards the outer periphery of the grinding discs. Part of the steam tends to flow back from this pressure centre to the centre of the grinding discs contrary to the direction of movement of the grinding goods, while another part of the steam from the pressure centre rushes outwards towards the outer periphery of the grinding discs while pulling with it the fibre material which thus often leaves the grinding apparatus in apparatus in insufficiently disintegrated condition.

US—A—3 473 745 discloses a refining plate in a grinding apparatus, which plate is divided into three refining zones, a breaker zone adjacent the inner edge of the plate, an intermediate zone, and a fine zone extending to the outer edge of the plate. The intermediate zone is provided with dams between the teeth to control the stock flow across this zone, to insure that the stock is uniformly subjected to the refining action by preventing direct radial stock flow. The outermost fine zone is provided with extremely fine teeth to insure that the stock is reduced in such a manner that the fibers are rolled along the tooth surfaces, causing a fibrillation of the fibers to produce the desirable even refining of the stock.

In grinding processes such as described above it has been a problem to prevent this exhaust of the pulp without disturbing or affecting the grinding process in other respects and the main object of the present invention is to provide a method and an apparatus for preventing exhaust of the fibre material in insufficiently worked condition. Another object is to provide such a method and apparatus without increase of the load on the grinding surfaces so that the conditions for the grinding process in other respects will not be disturbed.

These and other objects are achieved in that the method and apparatus according to the invention have been given the characteristic features defined in the following claims.

The invention will be described in more detail below with reference to the accompanying drawing which show embodiments of an apparatus for carrying out the method and in which:

Fig. 1 illustrates an imagined steam pressure curve showing the pressure course over a grinding segment which is represented in the section in Fig. 2 in relation to the steam pressure curve in Fig. 1;

Fig. 3 is a plan view of the segment in Figs. 1 and 2;

Fig. 4 is a plan view of an embodiment of a grinding segment according to the invention intended for use in a disc type grinding apparatus; and

Fig. 5 shows a section through part of the disc in Fig. 4.

In the drawings the numeral 10 in Fig. 2 designates a supporting plate which may be rotatably or stationarily mounted in a grinding apparatus. The section shown in Fig. 2 is taken radially through the ring-shaped grinding or supporting plate 10 the axis of rotation of which thus lies to the left of the section in Fig. 2. The supporting plate 10 has on one side a grinding segment divided up into three zones 12, 14 and 16 which are provided with patterns and define, together with the grinding segments of an opposed grinding plate (not shown), a grinding groove in which the grinding material is worked during its passages from the inner periphery to the outer periphery of the plate. To enable this working the grinding segment is provided with a coarse pattern 12 for breaking up the fibre material while the grinding segment in zone 14 has a somewhat finer pattern but still sufficiently coarse for coarse-working of the fibre material and finally in the zone 16 has a still finer pattern for the final fine-working of the fibre material before this leaves the imagined grinding groove at the outer periphery of the supporting plate 10, i.e. the right-hand end in Fig. 2. Of course the number of grinding zones may be larger or smaller than in the embodiment herein described.

Especially in one-stage grinding there is generated, because of the imposed high power, a high steam pressure in the grinding groove by the steam generated from moisture accompanying the fibre material. This causes high axial forces. In order to obtain good pulp quality, low shives content and high forces in the pulp the grinding segments should generally be fine-patterned and contain dams. The size and the fineness of the pattern in especially the outer zone 16 are controlled by the refiner construction and are defined practically by the backwardly flowing steam

amount, available axial load and the general stability of the refiner. Thus it is not possible without further measures to provide the grinding segment with a pattern of desired fineness since this would overload the grinding discs and the refiner, alternatively reduce the capacity if the imposed power should decrease.

Quite generally it has been found that the steam pressure curve in the grinding zones may be assumed to have the appearance represented in Fig. 1, which is related on the grinding plate in Fig. 2. Thus, it was found that the pressure in the grinding groove between the two opposed grinding segments from the zone 12, where the material is broken up and disintegrated, rises steeply during working in the coarse-grinding zone 14 in order finally to attain a maximum pressure somewhere along the grinding segment in the fine-working zone 16 in order thereupon to sink again in the direction of the outlet of the grinding groove, i.e. the outer periphery of the grinding plates 10. Thus the steam pressure curve shows a pressure peak or a pressure centre and it is known that all steam forming inside this pressure centre, which is designated by C in Fig. 1, flows back towards the inlet of the grinding groove while the remaining steam amount passes in the direction of the outlet of the grinding groove. If therefore the pattern density in the fine zone 16 is high, the steam pressure and the steam velocity increase, which gives a practical limitation of the pattern density that can be used.

According to the invention it has been found that if the approximate location of said pressure centre is established and the pattern of the grinding segments is sealed off, in a limited region around this zone 16, by means of dams or fine patterns then the fibre can be braked without any appreciable disturbance of the steam flow since the steam velocity in this region is practically nil. The fibre material will thus be braked by the fine pattern and is not exhausted by the steam flow but it will be sufficiently processed before leaving the grinding groove. In order not to disturb the conditions of the grinding process or the steam flow it is recommended to delimit the fine-patterned zone to a relatively small width, preferably in the order of 20—30 mm. The braking of the fibre material according to the method of this invention is effected in such a way that the axial load will not increase in any degree worth mentioning, which is a great advantage with consideration to the stability of the refiner and to make it possible to retain the parallel grinding groove between the grinding plates 10.

An example of a grinding segment of the new design is shown in Figs. 4 and 5. It is clear therefrom that, as compared to the conventional grinding segment according to Fig. 3, one has put in a finer pattern at the position of the pressure centre C, which finer pattern, as appears from Fig. 5, also has dams 18 to effect the desired braking of the material.

Claims

1. A method of making pulp of grinding goods, such as fibre material, in the grinding zone of a grinding apparatus by pressing it against a grinding surface provided with a pattern extending in the direction of movement of the grinding goods over the grinding surface for disintegration of the grinding goods, while the steam generated during the grinding work produces a pressure rise along the grinding surface, characterized by effecting a braking of the movement across the grinding surface of the grinding goods in that region where the steam pressure has its maximum with the aid of dams or of fine patterning of the grinding surface, which region is disposed uniformly on both sides of the steam pressure maximum.

2. Apparatus for carrying out the method as claimed in claim 1, including a grinding apparatus in which grinding material is worked by means of at least one grinding body, especially a grinding plate (10), which includes a grinding surface provided with a pattern extending in the direction of movement of the grinding goods over the grinding surface for disintegration of the grinding goods, during the grinding work steam is generated which, during the passage of the grinding goods over the grinding surface, reaches a pressure maximum, characterized in that the pattern (16) of the grinding surface in the region of the steam pressure maximum is restricted by means of dams in the grooves or has a finer pattern than the surrounding part of the grinding surface, said region being disposed uniformly on both sides of the steam pressure maximum and having a width of 10—50 mm, preferrably 20—30 mm.

Patentansprüche

1. Verfahren zur Herstellung von Halbstoff aus Mahlgut, wie Faserstoff, in der Mahlzone eines Mahlgerätes durch Anpressen desselben gegen eine Mahlfläche, die mit einem Muster versehen ist, welches sich in derselben Richtung wie die Bewegung des Mahlgutes über die Mahlfläche erstreckt, zwecks Zerkleinerung des Mahlgutes, wobei der bei der Mahlarbeit erzeugte Dampf eine Druckerhöhung entlang der Mahlfläche hervorruft, dadurch gekennzeichnet, dass man ein Abbremsen der Bewegung des Mahlgutes durch die Mahlzone im Bereich des Dapfdruckmaximums mit Hilfe von Aufdämmungsrücken oder einem feinen Muster der Mahlfläche bewirkt, wobei sich dieser Bereich gleichmässig beiderseits des Dampfdruckmaximums erstreckt.

2. Vorrichtung zur Ausübung des Verfahrens nach Anspruch 1, mit einem Mahlgerät, in dem das zu mahlende Material durch wenigstens einen Mahlkörper, insbesondere eine Mahlscheibe (10) bearbeitet wird, welche eine Mahlfläche aufweist, die mit einem Muster versehen ist, welches sich in derselben Richtung wie die Bewegung des Mahlgutes über die Mahlfläche zur

Zerkleinerung des Mahlgutes erstreckt, wobei während der Mahlarbeit Dampf wird, der während des Durchlaufes des Mahlgutes über die Mahlfläche ein Druckmaximum erreicht, dadurch gekennzeichnet, dass das Muster (16) der Mahlfläche im Bereich des Dampfdruckmaximums Aufdämmungsrücken in Vertiefungen oder ein feineres Muster als die umgebenden Zonen der Mahlfläche aufweist, wobei der genannte Bereich sich gleichmässig beiderseits des Dampfdruckmaximums erstreckt und eine Breite von 10—50 mm, vorzugsweise 20—30 mm, aufweist.

Revendications

1. Procédé de production de pulpe à partir de matières, telles que matières fibreuses, que l'on broie dans la zone de broyage d'un dispositif broyeur, en pressant la matière contre une surface de broyage pourvue d'une configuration de formes s'étendant dans la direction du mouvement des matières broyées, sur la surface de broyage, pour désintégrer les matières, la vapeur produite pendant le broyage engendrant une augmentation de pression de long de la surface de broyage, caractérisé par le fait que l'on soumet le mouvement que les matières broyées accomplissent le long de la surface de broyage à un freinage dans la région où la pression de vapeur est à son maximum, ce freinage étant réalisé à l'aide de serrements ou d'une fine configuration de formes sur la surface de broyage, ladite région étant aménagée uniformément des deux côtés du maximum de pression de vapeur.

2. Dispositif de mise en oeuvre du procédé selon la revendication 1, comportant un dispositif de broyage dans lequel la matière à broyer est travaillée au moyen d'au moins un corps de broyage, notamment une plaque de broyage (10), comportant une surface de broyage pourvue d'une configuration de formes s'étendant dans la direction du mouvement des matières broyées sur la surface de broyage et servant à désintégrer les matières à broyer, le travail de broyage s'accompagnant de la production de vapeur qui, au cours du passage des matières à broyer sur la surface de broyage, atteint un maximum de pression, caractérisé par le fait que la configuration de formes (16) à la surface de broyage dans le région du maximum de pression de vapeur est restreinte au moyen de serrements dans les rainures; ou possède une structure plus fine que la partie environnante de la surface de broyage, ladite région étant agencée uniformément des deux côtés du maximum de pression de vapeur et ayant une largeur de 10 à 50 mm, de préférence 20 à 30 mm.

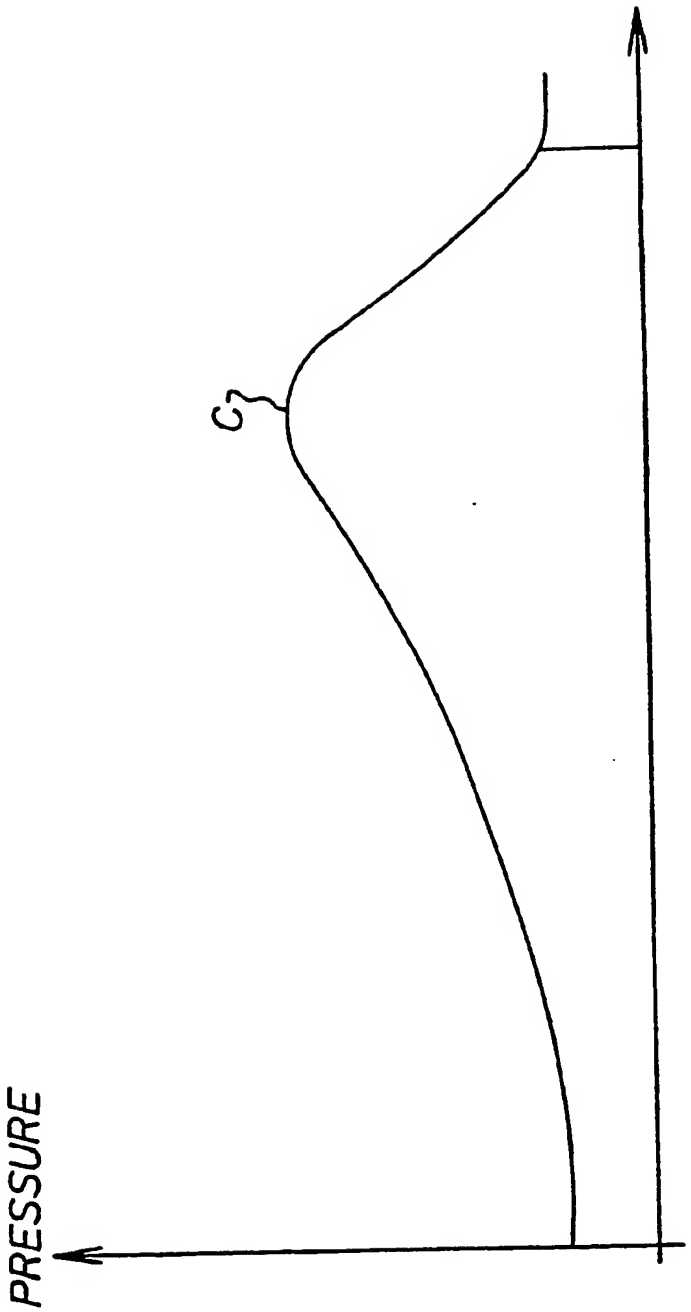

FIG.1

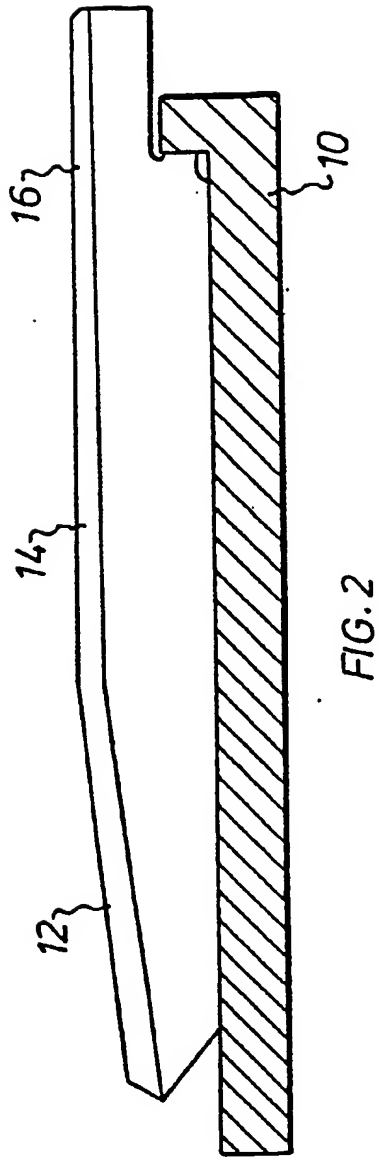

FIG. 2

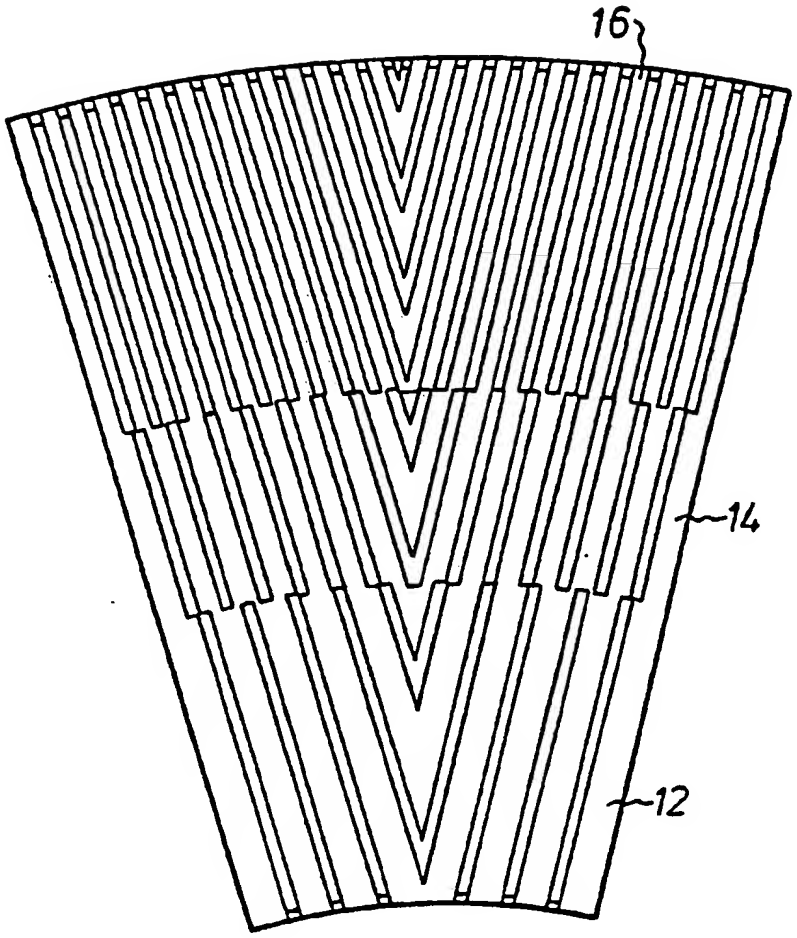

FIG.3

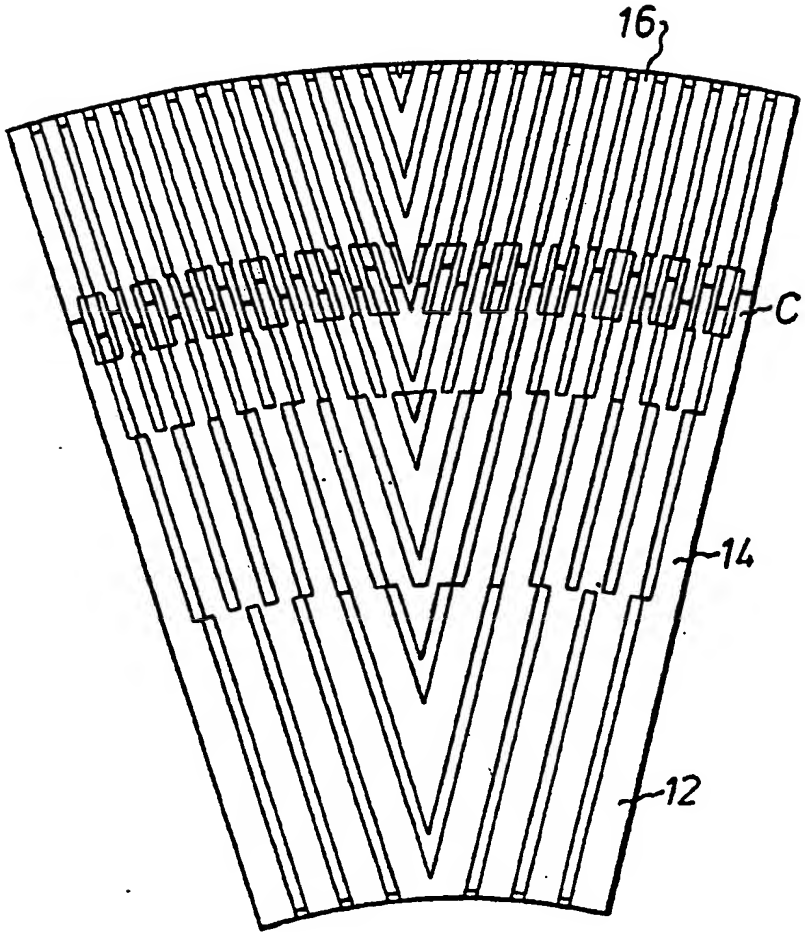

FIG. 4

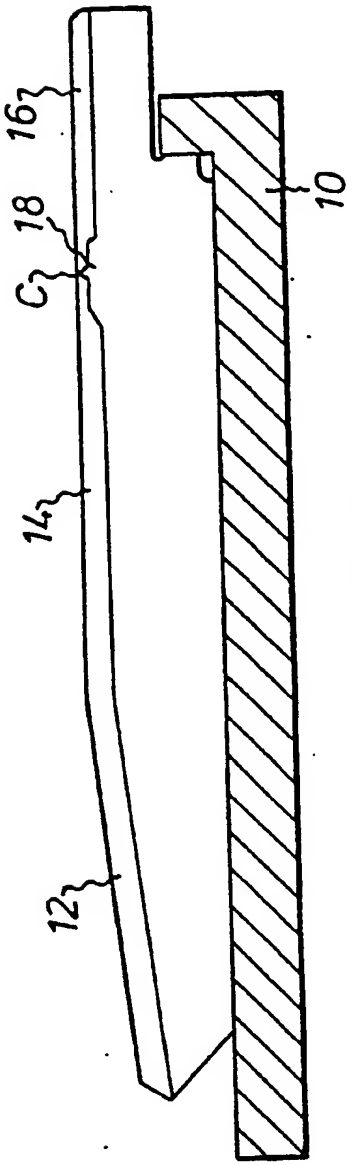

FIG.5